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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/856,738	MESTDAGH ET AL.	
	Examiner	Art Unit	
	Juan A. Torres	2631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 July 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-54* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-54* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 May 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *05-23-01*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore:

a) A method for operating a digital subscriber line transmission system, the system using N tones which correspond to N frequency domain value inputs, and having a maximum frequency, the method comprising: operating the system in a first operating mode, using q tones of the N possible tones as frequency domain value inputs; zeroing the N-q remaining frequency domain value inputs of the N frequency domain value inputs not included in the q frequency domain value inputs; setting the operating frequency of the system to q/N of the maximum operating frequency; operating the system in a second operating mode, the second operating mode using all N frequency domain value inputs; and setting the operating frequency of the system to the maximum operating frequency

b) A method by which a receiving modem can identify an operating mode of a plurality of operating modes of a transmitting modem using N tones, wherein the transmitting modem and the receiving modem are capable of functioning in any of the a plurality of operating modes, the method comprising: timing the receiving modem to the transmitting modem prior to the receiving modem establishing a communication with the

transmitting modem; using the transmitting modem to send a modem identification signal to the receiving modem; and the receiving modem obtaining the modem identification signal and identifying the operating mode.

Must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Figures 1-4 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid

abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The spacing of the lines of the specification is such as to make reading and entry of amendments difficult. New application papers with lines double spaced on good quality paper are required.

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: "Multistandard Discrete Multi-Tone (DMT) Digital Subscriber line (DSL) System".

The disclosure is objected to because of the following informalities:

In page 11 line 2-3 the recitation "Pidet, Castelain, Senn, Blanc" is improper; it is suggested to be changed to "Bidet, Castelain, Joanblanq, and Senn".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 47-50 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

As per claim 47 the specification doesn't disclose any structure to show the means for operating the transmitting modem in a plurality of digital subscriber line standards.

As per claim 48 the specification doesn't disclose any structure to show means for operating the receiving modem in the plurality of digital subscriber line standards.

As per claim 49 the specification doesn't disclose any structure to show the means for enabling the receiving modem to detect an operating mode of the plurality of digital subscriber line standards of the transmitting modem prior to the receiving modem establishing communication with the transmitting modem.

As per claim 50 the specification doesn't disclose any structure to show means for adjusting an amount of power consumed by the receiving modem and the transmitting modem in dependence on an operating mode of the plurality of digital subscriber line standards of the receiving modem and the transmitting modem

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 4, 5 and 47 are rejected under 35 U.S.C. 102(b) as being anticipated by Bingham (US 5680394).

As per claim 1 Bingham discloses a digital subscriber line transmission system using QAM modulation on N=2048 or 4096 tones spaced by 4.3125 kHz, including at least two operating modes (column 1 lines 24-37): a VDSL standard operating mode where all N tones are used to convey significant values (column 1 lines 24-37); and an ADSL standard operating mode where only the first n=128 or 256 among the N tones are used to convey significant values (column 1 lines 12-24).

As per claim 4 Bingham discloses in the transmitter side, an inverse fast Fourier transform circuit having: a number of frequency domain inputs selectable at least among values N and n (column 1 lines 36-37); and an operating frequency selectable at least among two values F and fn proportional, respectively, to the frequency of the last of the N tones and the last of the n tones (column 1 lines 24-26).

As per claim 5 Bingham discloses at a receiver side, a fast Fourier transform circuit having: a number of frequency domain outputs selectable at least among values N and n (column 1 lines 36-37); and an operating frequency selectable at least among values F and fn (column 1 lines 24-26), as it is inherit to the transmitter.

As per claim 47 Bingham discloses a digital subscriber line transmission system using QAM modulation on N=2048 tones or N=4096 tones spaced by 4.3125 kHz, the system comprising (column 1 lines 24-37): a transmitting modem (figure 6 block 201 column 4 line 49-51); and means for operating the transmitting modem in a plurality of digital subscriber line standards (column 1 line 62 to column 2 line 8).

Claims 1, 4, 5, 21-28 and 40-50 are rejected under 35 U.S.C. 102(e) as being anticipated by Cioffi (US 5673290).

As per claim 1 Cioffi discloses a digital subscriber line transmission system using QAM modulation on N=2048 or 4096 tones spaced by 4.3125 kHz, including at least two operating modes (column 2 line 60 to column 3 line 4): a VDSL standard operating mode where all N tones are used to convey significant values (column 3 line 4); and an ADSL standard operating mode where only the first n=128 or 256 among the N tones are used to convey significant values (column 3 line 4 and column 4 lines 6-25).

As per claim 4 Cioffi discloses claim 1, Cioffi also discloses in the transmitter side, an inverse fast Fourier transform circuit having: a number of frequency domain inputs selectable at least among values N and n (column 3 line 4); and an operating frequency selectable at least among two values F and fn proportional, respectively, to the frequency of the last of the N tones and the last of the n tones (column 2 line 64).

As per claim 5 Cioffi discloses claim 1, Cioffi also discloses at a receiver side, a fast Fourier transform circuit having: a number of frequency domain outputs selectable at least among values N and n (column 3 line 4); and an operating frequency selectable at least among values F and fn (column 2 line 64), as it is inherit to the transmitter.

As per claim 21 Cioffi discloses claim 1. Cioffi also discloses that the receiving modem can identify the standard operating mode before establishing communication with a transmitting modem with 256 tones or 512 tones (column 4 lines 27-49).

As per claim 22 Cioffi discloses claim 21. Cioffi also discloses that the transmitting modem sends a modem identification signature (256 or 512 tones column 4 lines 27-49) and the receiving modem identifying which of the N tones are present identifies the standard operating mode (256 or 512 tones column 4 lines 27-49).

As per claim 23 Cioffi discloses claim 22. Cioffi also discloses the modem identification signature comprises a signal comprising a plurality of the N tones (256 or 512 tones column 4 lines 27-49).

As per claim 24 Cioffi discloses claim 23. Cioffi also discloses that the modem identification signature of an ADSL modem comprises a plurality of consecutive tones (1-256 or 1-512 column 4 lines 27-49).

As per claim 25 Cioffi discloses claim 23. Cioffi also teaches that the transmitting modem is an ADSL modem (column 1 line 17); and wherein the modem identification signature comprises every pth tone of the N tones, p being a power of 2 (column 9 lines 11-14 and 44-46).

As per claim 26 Cioffi discloses claim 23. Cioffi also teaches that the transmitting modem is a VDSL Zipper modem and the receiving modem is a VDSL-TDD modem (column 4 lines 50-59); and wherein the modem identification signature comprises every 8th tone of the VDSL Zipper modem (this is a designer choice where p take the value 8 see Cioffi column 9 lines 11-14 and lines 44-46).

As per claim 27 Cioffi discloses claim 23. Cioffi also teaches that the transmitting modem is a VDSL Zipper modem and the receiving modem is a VDSL-TDD modem (column 4 lines 50-59); and wherein the modem identification signature comprises every 4th tone of the VDSL Zipper modem (this is a designer choice where p take the value 4 see Cioffi column 9 lines 11-14 and lines 44-46).

As per claim 28 Cioffi discloses a method for operating a digital subscriber line transmission system, the system using N tones which correspond to N frequency domain value inputs, and having a maximum frequency, the method comprising: operating the system in a first operating mode, using q tones of the N possible tones as frequency domain value inputs (column 1 line 24-27); zeroing the N-q remaining frequency domain value inputs of the N frequency domain value inputs not included in the q frequency domain value inputs (column 3 lines 2-4); setting the operating frequency of the system to q/N of the maximum operating frequency (column 4 lines 18-19); operating the system in a second operating mode, the second operating mode using all N frequency domain value inputs (column 3 lines 2-4); and setting the operating frequency of the system to the maximum operating frequency (2048 or more tones x 4.3125 column 3 lines 2-4).

As per claim 40 Cioffi discloses a method by which a receiving modem can identify an operating mode of a plurality of operating modes of a transmitting modem using N tones, wherein the transmitting modem and the receiving modem are capable of functioning in any of the a plurality of operating modes (column 3 lines 2-4), the method comprising: timing the receiving modem to the transmitting modem prior to the

receiving modem establishing a communication with the transmitting modem (It is inherit to a modem working in more than one mode that the receiving modem can identify the operating mode before establishing communication with a transmitting modem, other wise the communication will not take place); using the transmitting modem to send a modem identification signal to the receiving modem (It is inherit to a modem working in more than one mode that the transmitting modem sends a modem identification signal); and the receiving modem obtaining the modem identification signal and identifying the operating mode (It is inherit to a modem working in more than one mode that the receiver modem identify the operation mode).

As per claim 41 Cioffi discloses claim 40. Cioffi also discloses tuning the receiving modem to the transmitting modem prior to the receiving modem establishing communication with the transmitting modem further comprises the receiving modem using at least the N tones used by the transmitting modem (column 2 lines 54-59).

As per claim 42 Cioffi discloses claim 41. Cioffi also discloses using the transmitting modem to send a modem identification signal to the receiving modem further comprises the transmitting modem sending a specific set of tones chosen from the set of N possible tones (column 9 lines 11-14 and lines 44-46).

As per claim 43 Cioffi discloses claim 42. Cioffi also discloses using the transmitting modem to send a modem identification signal to the receiving modem further comprises using a VDSL Zipper modem to send every 8th tone of the set of N possible tones to a VDSL-TDD modem (column 9 lines 11-14).

As per claim 44 Cioffi discloses claim 42. Cioffi also discloses using the transmitting modem to send a modem identification signal to the receiving modem further comprises using a VDSL Zipper modem to send every 4th tone of the set of N possible tones to a VDSL-TDD modem (this is a designer choice where p take the value 4 see Cioffi column 9 lines 11-14 and lines 44-46).

As per claim 45 Cioffi discloses claim 42. Cioffi also discloses using the transmitting modem to send a modem identification signal to the receiving modem further comprises using an ADSL modem to send a set of consecutive tones (column 4 lines 27-41).

As per claim 46 Cioffi discloses claim 42. Cioffi also discloses using the transmitting modem to send a modem identification signal to the receiving modem further comprises using an ADSL modem to send every pth tone, where p is a power of 2 (column 9 lines 11-14 and 44-46).

As per claim 47 Cioffi discloses a digital subscriber line transmission system using QAM modulation on N=2048 tones or N=4096 tones spaced by 4.3125 kHz, the system comprising (column 3 line 4): a transmitting modem (figure 5 block 20 column 7 lines 51-53); and operating the transmitting modem in a plurality of digital subscriber line standards (column 7 lines 53-56).

As per claim 48 Cioffi discloses claim 47. Cioffi also discloses a receiving modem (column 2 lines 56-59); and operating the receiving modem in the plurality of digital subscriber line standards (column 3 lines 2-4).

As per claim 49 Cioffi discloses claim 48. Cioffi also discloses enabling the receiving modem to detect an operating mode of the plurality of digital subscriber line standards of the transmitting modem prior to the receiving modem establishing communication with the transmitting modem (column 3 lines 2-4).

As per claim 50 Cioffi discloses claim 48. Cioffi also discloses adjusting an amount of power consumed by the receiving modem and the transmitting modem in dependence on an operating mode of the plurality of digital subscriber line standards of the receiving modem and the transmitting modem (column 6 line 62 to column 7 line 1).

Claims 51 and 52 are rejected under 35 U.S.C. 102(b) as being anticipated by Bidet ("A fast single-chip implementation of 8192 complex point FFT", IEEE Journal of Solid-State Circuits, Vol. 30, N 3 March 1995, Page(s): 300-305).

As per claim 51 Bidet discloses an inverse fast Fourier transform circuit having a selectable number of frequency domain inputs and a selectable operating frequency (page 301 section II.C and figure 5 page 303 section II.E).

As per claim 52 Bidet discloses a fast Fourier transform circuit having a selectable number of frequency domain outputs and a selectable operating frequency (page 301 section II.C and figure 5 page 302 section II.E); and a controller configured to control the operating frequency of the inverse fast Fourier transform circuit and the fast Fourier transform circuit (figure 5 block "control" page 303 section II.E).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cioffi (US 5673290) as applied to claim 1 above, and further in view of Rybicki (US 5742527). Cioffi discloses claim 1. Cioffi also discloses an inverse fast Fourier transform circuit having N frequency domain value inputs corresponding, among which only the first receive values corresponding to the n used tones, the remaining inputs being zeroed (column 3 lines 2-4). Cioffi also discloses a digital-to-analog converter coupled to the subscriber line (figure 8 block 28 column 8 lines 34-37). Cioffi doesn't disclose the use of a decimator. Rybicki discloses the use of decimators in DSL lines (figure 12 and 14 blocks 205 and 227 column 8 lines 44-45 and column 10 lines 15-15). Cioffi and Rybicki are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the decimator disclosed by Rybicki. The suggestion/motivation for doing so would have been to convert the DSL signal to the baseband and to simplify the design of the systems reducing the number of sample at the transmitter side (Rybicki abstract). Therefore, it would have been obvious to combine Cioffi with Rybicki to obtain the invention as specified in claim 2.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cioffi (US 5673290) and Rybicki (US 5742527) as applied to claim 2 above, and further in view of

Admission. Cioffi with Rybicki disclose claim 2. Cioffi also discloses an analog-to-digital converter sampling the signal on the subscriber line (figure 8 block 32 column 8 line 51) and a fast Fourier transform circuit operating at frequency F and receiving the samples from a time domain equalizer (figure 8 block 31 column 8 lines 50-64). Cioffi doesn't disclose the use of an integrator. Rybicki discloses the use of integrators in DSL lines (figure 12 and 14 blocks 205 and 227 column 8 lines 44-45 and column 10 lines 15-15). Admission discloses that when all N tones are used, the time domain equalizer is bypassed (page 3 line23-24). Cioffi, Rybicki and Admission are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the Fast Fourier Transform disclosed by Cioffi and Rybicki with the integrator disclosed by Rybicki. The suggestion/motivation for doing so would have been to convert the DSL signal to simplify the design of the systems to reduce the number of sample at the transmitter side (Rybicki abstract). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the Fast Fourier Transform disclosed by Cioffi and Rybicki with the integrator disclosed by Admission. The suggestion/motivation for doing so would have been to reduce the complexity of the receiver when all the N tones are used (Admission page 3 lines 23-24 of the disclosure). Therefore, it would have been obvious to combine Bidet with Chow to obtain the invention as specified in claim 3.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bingham (US 5680394) as applied to claim 5 above, and further in view of Bidet ("A fast single-

chip implementation of 8192 complex point FFT", IEEE Journal of Solid-State Circuits, Vol. 30, N 3 March 1995, Page(s): 300-305). Bingham discloses claim 5. Bingham doesn't disclose that each of the inverse fast Fourier transform and fast Fourier transform circuits includes five radix-4 stages and a last stage having a radix selectable among 2 and 4, all connected to operate in pipeline mode, the desired number of frequency domain inputs or outputs of the circuit being selectable by passing an appropriate number of the five radix-4 stages and by selecting the radix of the last stage. Bidet discloses a method for computing inverse fast Fourier transform and fast Fourier transform circuits includes five radix-4 stages and a last stage having a radix selectable among 2 and 4, all connected to operate in pipeline mode, the desired number of frequency domain inputs or outputs of the circuit being selectable by passing an appropriate number of the five radix-4 stages and by selecting the radix of the last stage (page 301 section II.C and figure 5 page 303 section II.E). Bingham and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Bingham with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Bingham and Bidet to obtain the invention as specified in claim 6.

Claims 6-20 and 29-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cioffi (US 5673290) as applied to claim 5 above, and further in view

of Bidet ("A fast single-chip implementation of 8192 complex point FFT", IEEE Journal of Solid-State Circuits, Vol. 30, N 3 March 1995, Page(s): 300-305).

As per claim 6 Cioffi discloses claim 5. Cioffi doesn't disclose that each of the inverse fast Fourier transform and fast Fourier transform circuits includes five radix-4 stages and a last stage having a radix selectable among 2 and 4, all connected to operate in pipeline mode, the desired number of frequency domain inputs or outputs of the circuit being selectable by passing an appropriate number of the five radix-4 stages and by selecting the radix of the last stage. Bidet discloses a method for computing inverse fast Fourier transform and fast Fourier transform circuits includes five radix-4 stages and a last stage having a radix selectable among 2 and 4, all connected to operate in pipeline mode, the desired number of frequency domain inputs or outputs of the circuit being selectable by passing an appropriate number of the five radix-4 stages and by selecting the radix of the last stage (page 301 section II.C and figure 5 page 303 section II.E). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 6.

As per claim 7 Cioffi and Bidet disclose claim 6. Bidet also teaches that the desired number of frequency domain inputs or outputs of the circuit is the product of the

radices of all stages which are not bypassed (page 301 section II.C and figure 5 page 303 section II.E). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 7.

As per claim 8 Cioffi and Bidet disclose claim 6. Bidet also teaches that each stage receives and provides complex coefficients at a digital data transmission rate (page 301 section II.C and figure 5 page 303 section II.E); each complex coefficient has a real part and an imaginary part (page 301 section II.C and figure 5 page 303 section II.E); the real part of each complex coefficient and the imaginary part of each complex coefficient are processed in two distinct cycles (page 301 section II.C and figure 5 page 303 section II.E); and wherein the operating frequency of the system is twice the digital data transmission rate (page 301 section II.C and figure 5 page 303 section II.E). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the

transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 8.

As per claim 9 Cioffi and Bidet disclose claim 6. Bidet also teaches that ADSL-Lite standard operating mode (N=128) is implemented by bypassing two of the five radix-4 stages and selecting the last stage to be radix-2 (page 301 section II.C and figure 5 page 303 section II.E). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 9.

As per claim 10 Cioffi and Bidet disclose claim 6. Cioffi also teaches that in this case the operating frequency is 1.104 MHz (128 tones x 4.3125 space between tones x 2 real + imaginary) (column 3 line 4). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract).

Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 10.

As per claim 11 Cioffi and Bidet disclose claim 6. Bidet also teaches an operating mode with N=256 implemented by bypassing two of the five radix-4 stages and selecting the last stage to be radix-4 (page 301 section II.C and figure 5 page 303 section II.E). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 11.

As per claim 12 Cioffi and Bidet disclose claim 6. Cioffi also teaches that in this case the operating frequency is 2.208 MHz (256 tones x 4.3125 space between tones x 2 real + imaginary) (column 3 line 4 and column 4 lines 32-36). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 12.

As per claim 13 Cioffi and Bidet disclose claim 6. Bidet also teaches that N= 2048 tones, is implemented by bypassing none of the five radix-4 stages and selecting the last stage to be radix-2 (page 301 section II.C and figure 5 page 303 section II.E). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 13.

As per claim 14 Cioffi and Bidet disclose claim 6. Cioffi also teaches that in this case the operating frequency is 1 7.664 MHz (2048 tones x 4.3125 space between tones x 2 real + imaginary) (column 3 line 4). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 14.

As per claim 15 Cioffi and Bidet disclose claim 6. Bidet also teaches that N=4096 tones, is implemented by bypassing none of the five radix-4 stages and selecting the

last stage to be radix-4 (page 301 section II.C and figure 5 page 303 section II.E). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 15.

As per claim 16 Cioffi and Bidet disclose claim 6. Cioffi also teaches that in this case the operating frequency is 35.328 MHz (4096 tones x 4.3125 space between tones x 2 real + imaginary) (column 3 line 4). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 16.

As per claim 17 Cioffi and Bidet disclose claim 6. Bidet also teaches that 512 tones is implemented by bypassing one of the radix-4 stages and selecting the last stage to be radix-2 (page 301 section II.C and figure 5 page 303 section II.E). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time

of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 17.

As per claim 18 Cioffi and Bidet disclose claim 6. Bidet also teaches that 256 tones is implemented by bypassing two of the radix-4 stages and selecting the last stage to be radix-4 (page 301 section II.C and figure 5 page 303 section II.E). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 18.

As per claim 19 Cioffi and Bidet disclose claim 6. Cioffi also teaches that VDSL standard operating mode may be used for a VDSL-TDD transmission, the VDSL-TDD transmission having a maximum frequency of 17.664 MHz (4.3125 *4096=17664) (column 3 line 4). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by

Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 19.

As per claim 20 Cioffi and Bidet disclose claim 6. Cioffi also teaches that VDSL standard operating mode may be used for a VDSL-TDD transmission, the VDSL-TDD transmission having a maximum frequency of 35.328 MHz (4.3125 *8192=35328) (column 3 line 4). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 20.

As per claim 29 Cioffi discloses claim 28. Cioffi doesn't disclose that operating the system in a first operating mode further comprises selecting the q tones to be used as frequency domain value inputs by bypassing elements of a pipelined circuit. Bidet discloses a method for computing inverse fast Fourier transform and fast Fourier transform circuits that comprises selecting the q tones to be used as frequency domain value inputs by bypassing elements of a pipelined circuit (page 301 section II.C and figure 5 page 303 section II.E). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to

a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 29.

As per claim 30 Cioffi and Bidet disclose claim 29. Cioffi also teaches that the first operating mode is ADSL standard operating mode (column 4 lines 15-19). Bidet also teaches that the pipelined circuit comprises five pipelined radix-4 stages and a last stage operable as radix-2 or radix-4 (page 301 section II.C and figure 5 page 303 section II.E); and wherein operating the system in the first operating mode further comprises bypassing two of the five pipelined radix-4 stages and operating the last stage as radix-4 (figure 5 page 303 section II.E). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 30.

As per claim 31 Cioffi and Bidet disclose claim 30. Cioffi also teaches setting the operating frequency to q/N of the maximum operating frequency further comprises

setting the operating frequency of the system to 2.208 MHz (256 tones x 4.3125 space between tones x 2 real + imaginary) (column 3 line 4 and column 4 lines 32-36). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 31.

As per claim 32 Cioffi and Bidet disclose claim 29. Cioffi also teaches first operating mode is ADSL-Lite (column 3 line 2-4 128 tones). Bidet also teaches that the pipelined circuit comprises five pipelined radix-4 stages and a last stage operable as radix-2 or radix-4 (page 301 section II.C and figure 5 page 303 section II.E); and operating the system in the first operating mode further comprises bypassing two of the five pipelined radix-4 stages and operating the last stage as radix-2 (page 301 section II.C and figure 5 page 303 section II.E). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract).

Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 32.

As per claim 33 Cioffi and Bidet disclose claim 32. Cioffi also teaches setting the operating frequency to q/N of the maximum operating frequency further comprises setting the operating frequency of the system to 1.104 MHz (128 tones x 4.3125 space between tones x 2 real + imaginary) (column 3 line 4). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 33.

As per claim 34 Cioffi and Bidet disclose claim 29. Cioffi also teaches second operating mode is a VDSL using N=2048 tones (column 3 lines 2-4). Bidet also teaches that circuit comprises five pipelined radix-4 stages and a last stage operable as radix-2 or radix-4 (page 301 section II.C and figure 5 page 303 section II.E); and the system in the second operating mode further comprises not bypassing any of the five pipelined radix-4 stages and operating the last stage as radix-2 (page 301 section II.C and figure 5 page 303 section II.E). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform

disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 34.

As per claim 35 Cioffi and Bidet disclose claim 34. Cioffi also teaches setting the operating frequency of the system to the maximum operating frequency further comprises setting the operating frequency to 17.664 MHz (4.3125 *4096=17664) (column 3 line 4). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 35.

As per claim 36 Cioffi and Bidet disclose claim 29. Cioffi also teaches a second operating mode is a VDSL standard with N=4096 tones (column 3 lines 2-4). Bidet also teaches that the pipelined circuit comprises five pipelined radix-4 stages and a last stage operable as radix-2 or radix-4 (page 301 section II.C and figure 5 page 303 section II.E); and operating the system in the second operating mode further comprises not bypassing any of the five pipelined radix-4 stages and operating the last stage as radix-4 (page 301 section II.C and figure 5 page 303 section II.E). Cioffi and Bidet are

analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 36.

As per claim 37 Cioffi and Bidet disclose claim 36. Cioffi also teaches setting the operating frequency of the system to the maximum operating frequency further comprises setting the operating frequency to 35.328 MHz (4.3125 *8192=35328) (column 3 line 4). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 37.

As per claim 38 Cioffi and Bidet disclose claim 29. Cioffi also teaches an operating mode with q=512 frequency domain inputs (column 4 lines 36-39). Bidet also teaches that the pipelined circuit comprises five pipelined radix-4 stages and a last stage operable as radix-2 or radix-4 (page 301 section II.C and figure 5 page 303 section II.E); and operating the system in the first operating mode further comprises

bypassing one of the five pipelined radix-4 stages and operating the last stage as radix-2 (page 301 section II.C and figure 5 page 303 section II.E). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract). Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 38.

As per claim 39 Cioffi and Bidet disclose claim 29. Cioffi also teaches an operating mode using q=256 frequency domain inputs (column 4 lines 15-18). Bidet also teaches that n the pipelined circuit comprises five pipelined radix-4 stages and a last stage operable as radix-2 or radix-4 (page 301 section II.C and figure 5 page 303 section II.E); and the system in the first operating mode further comprises bypassing two of the five pipelined radix-4 stages and operating the last stage as radix-4 (page 301 section II.C and figure 5 page 303 section II.E). Cioffi and Bidet are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Cioffi with the method for computing inverse fast Fourier transform and fast Fourier transform disclosed by Bidet. The suggestion/motivation for doing so would have been to reduce the cost of the transceiver (Bidet abstract).

Therefore, it would have been obvious to combine Cioffi and Bidet to obtain the invention as specified in claim 39.

Claim 53 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bidet ("A fast single-chip implementation of 8192 complex point FFT", IEEE Journal of Solid-State Circuits, Vol. 30, N 3 March 1995, Page(s): 300-305) as applied to claim 52 above, and further in view of Chow (US 6009122). Bidet discloses claim 52. Bidet doesn't disclose a frequency domain equalizer to receive and operate on an output of the fast Fourier transform circuit. It is very well known and Chow discloses a frequency domain equalizer to receive and operate on an output of the fast Fourier transform circuit (figure 1B and figure 6 block 156 column 12 lines 41-43). Bidet and Chow are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Bidet with the Frequency Domain Equalizer disclosed by Chow. The suggestion/motivation for doing so would have been to perform the equalization on the digital signals so the attenuation and phase are equalized over the various frequency tones (Chow column 3 lines 41-45). Therefore, it would have been obvious to combine Bidet with Chow to obtain the invention as specified in claim 53.

Claim 54 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bidet ("A fast single-chip implementation of 8192 complex point FFT", IEEE Journal of Solid-State Circuits, Vol. 30, N 3 March 1995, Page(s): 300-305) and Chow (US 6009122) as applied to claim 52 above, and further in view of Wiese (US 6014412). Bidet and Chow discloses claim 53. Bidet and Chow don't disclose a radio frequency interference

canceller to receive and operate on an output of the frequency domain equalizer. It is very well known and Wiese discloses a radio frequency interference canceller connected with the frequency domain equalizer (figure 7 block 722 column 9 line 58). The radio frequency interference canceller disclosed by Wiese is located after the FFT and before the FEQ, instead of after the FEQ, but the shifting in location of part doesn't affect the operability and the function of the system that is to cancel the RFI noise, that will provide a better performance in the FEQ. Bidet, Chow and Wiese are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to supplement the inverse Fast Fourier Transform disclosed by Bidet and Chow with the a radio frequency interference canceller disclosed by Wiese. The suggestion/motivation for doing so would have been to reduce the RF interference and in order to improve the performance of the receiver (Wiese column 9 lines 58-67). Therefore, it would have been obvious to combine Bidet with Chow to obtain the invention as specified in claim 54.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juan A. Torres whose telephone number is (571) 272-3119. The examiner can normally be reached on Monday-Friday 9:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad H. Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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JAT
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